

THE EFFECT OF MEALWORM (*Tenebrio molitor*) LARVAE AS  
PROTEIN SOURCES TO THE GROWTH PERFORMANCE  
OF RED TILAPIA (*Oreochromis sp*)

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Mealworm meal (MWM) was evaluated to investigate the effect of partial or total replacement of fish meal (FM) in diets for Red tilapia fingerlings, *Oreochromis sp.* The body weight, total length and standard length were observed by week. The experiment was done in triplicate with initial mean body weight of fish was 6.55-8.48g, total length 7.25-8.14cm and standard length 5.27-6.14cm. The fish were fed each of 5 isonitrogenous (37% crude protein) diets formulated including 0, 20, 40, 60, and 80% (diet 1-5, respectively) of FM being substituted by MWM. The results were assessed by proximate analysis composition and chemical. The dry matter was done by drying in oven at 100°C for 6 hours, crude protein was determined (as N x 6.25) by Kjeldahl method after acid digestion, crude fat by Soxhlet method after petroleum ether extraction, and ash combustion at 600°C in a muffle furnace for 6 hours. 6 weeks of feeding trials, Red tilapia fed with diets up to 60% replacement of FM with MWM (diet 2, diet 3 and diet 4) showed significantly high growth performance on weight gain and specific growth rate (SGR), feed conversion ratio (FCR) compared to fish fed with control diet without MWM (diet 1). Red tilapia fed with diet 4 showed the highest growth performance while diet 5 showed the lowest growth performance. Diet 4 (1.14) showed FCR was significantly lower (better) while the poor FCR for diet 1(1.45) and diet 5 (1.45). SGR, FCR and PER of fish fed with diets containing 20%, 40% and 60% MWM inclusion in the experimental diets were increase while as the MWM replacement level increased 80% , SGR, FCR and PER decrease. Better growth of fish also effected by optimum water parameter such as pH, temperature and dissolved oxygen (DO). Survival range was 100% in all treatments.

Abstrak tesis yang dikemukakan kepada senat Universiti Malaysia  
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Ijazah Master Sains

**KESAN CACING (*Tenebrio molitor*) SEBAGAI SUMBER PROTEIN UTAMA  
TERHADAP PERKEMBANGAN TUMBESARAN ANAK  
IKAN TILAPIA MERAH (*Oreochromis sp.*)**

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Cacing MWM (*Tenebrio molitor*) telah dinilai untuk menyelidik kesan penggantian sebahagian atau sepenuhnya dengan tepung ikan (FM) dalam diet anak ikan Tilapia Merah, *Oreochromis sp.*. Berat badan, Eksperimen ini dilakukan dengan 3 replika yang mempunyai purata berat badan awal 6.55-8.48g, jumlah panjang 7.25-8.14cm dan panjang piawai 5.27-6.14cm. jumlah panjang dan panjang piawai ikan telah diperhatikan setiap minggu. Lima diet isonitrogenous (38% protein mentah) telah diformulasi untuk memasukkan 0, 20, 40, 60 dan 80% (mewakili diet 1-5) MWM sebagai menggantikan FM. Keputusan telah dinilai oleh komposisi analisis proksimat dan kimia. Bahan kering telah dilakukan dengan pengeringan di dalam ketuhar pada 100°C untuk 6 jam, protein mentah telah ditentukan (sebagai N x 6.25) oleh kaedah Kjeldahl selepas pencernaan asid, lemak mentah oleh kaedah Soxhlet selepas pengekstrakan eter petroleum, dan pembakaran abu pada 600°C dalam *muffle furnace* selama 6 jam. Selepas 6 minggu ujian makanan, ikan Tilapia Merah yang diberi makan dengan diet penggantian sehingga 60% FM dengan MWM (diet 2, diet 3 dan diet 4) didapati mempunyai nilai tertinggi bagi peningkatan berat, kadar pertumbuhan spesifik (SGR) dan nisbah penukaran makanan (FCR) yang lebih baik berbanding dengan diet makanan tanpa MWM (diet 1). Tilapia Merah diet 4 menunjukkan kadar pertumbuhan tertinggi manakala diet 5 menunjukkan kadar pertumbuhan terendah. Diet 4 (1.14) menunjukkan FCR adalah jauh lebih rendah (lebih baik) manakala FCR tinggi (kurang baik) untuk diet 1 (1.45) dan diet 5 (1.45). Nilai SGR, FCR dan PER bagi ikan yang diberi makan dengan diet yang mengandungi 20%, 40% dan 60% MWM dalam eksperimen ini telah meningkat sedikit manakala bagi tahap penggantian MWM yang ditambah sehingga 80%, nilai SGR, FCR dan PER menurun. Pertumbuhan yang lebih baik bagi ikan juga dipengaruhi oleh parameter air optimum seperti pH, suhu dan oksigen terlarut (DO). Kadar hidup adalah 100% dalam semua rawatan.